V RESPONSES TO COMMENTS FROM THE CITY AND COUNTY OF DENVER

1. *Comment: Denver supports EPA's preferred alternative, alternative 3, offsite removal. This alternative is the only alternative that protects human health and the environment. Offsite removal is the only alternative that will meet the legal requirements (ARARs) that USEPA chose for the Shattuck operable unit and the other operable units of the Denver Radium Site. USEPA reached this same conclusion at the other 10 operable units of the Denver Radium Site over ten years ago. USEPA reached this same conclusion last Fall after the Five-Year Review, the report by EPA's Environmental Response Team, the Ombudsman's investigation and an independent review by USEPA headquarters of the data and the law governing the Shattuck operable unit. After EPA's investigation, Assistant Administrator Tim Fields stated, "I believe that the Shattuck waste has to be removed to ensure long-term protection of human health and the environment." Assistant Administrator Fields announced that the Proposed Plan would be developed for public comment to document the conclusions USEPA reached in its Five-Year Review.*

Although the Proposed Plan documents EPA's conclusion that the preferred remedy is offsite removal, the Proposed Plan fails to document EPA's conclusion that offsite removal is the only remedy that protects human health and the environment in both the short-term and the long-term. Only offsite removal meets the ARARs USEPA chose for the Denver Radium Site. Only offsite removal comports with good public policy embodied in Federal, state and local laws governing radioactive waste: long-term radioactive waste disposal dumps do not belong in the heart of a city. USEPA must re-write its evaluation of the nine criteria to properly document its conclusion that only offsite removal completely protects human health and the environment and meets ARARs.

Response: USEPA has rewritten its comparative evaluation of the alternatives in the Decision Summary of the ROD amendment which selects the offsite removal remedy as the alternative that best protects human health and the environment and complies with ARARs.

2. *Comment: Alternatives 1 and 2 fail to protect human health and the environment because they do not meet legal and technical requirements. Alternatives 1 and 2 would leave the monolith in place, even though experts have concluded it will not work. USEPA chose the Uranium Mill Tailings Radiation Control Act as the primary legal standard for this and other Denver Radium Site remedies. The overarching standard set by this act for remedies to control radioactive waste is*

that they be "designed to be effective for up to one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years." 40 CFR Part 192, §192.02. This is the standard all the siting and design criteria in state and federal law and the design features of the remedy are trying to achieve. This is the benchmark for whether a remedy at the Denver Radium Site can be considered protective of human health and the environment. The proponent of a remedy has the burden to prove that the remedy can be protective for 200 to 1000 years. If this cannot be demonstrated, then the remedy cannot be chosen. The Five-Year Review and EPA's Environmental Response Team concluded that: the cap design is inadequate and may last as little as thirty years, the waste is too close to groundwater, a liner should have been installed, the cap would need continued replacement, and the concrete stabilization may not hold the contaminants through the long-term. These studies concluded that the monolith and remaining contamination beneath the monolith may be contaminating groundwater today and the monitoring system is inadequate to show whether contamination has been addressed by the remedy, or to give early warning of a remedy failure. The Five-Year Review report concluded "the goals of the original remedial design were not stringent enough and could have fallen short of the ARAR requirements in place at the time of the remedy." Finally, the Five-Year Review concluded that "there is concern about the long-term effectiveness and permanency of the site remedy and the concomitant ability of the site to meet the optimization and institutional requirements inherent within the remedy." Five-Year Review at p. IX-1.

Response: The The Emergency Response Team (ERT) report states that the cap will probably fail as presently designed within a few years but points out that it is difficult to accurately predict how many years it may take to fail. This report also raises concerns about the potential impact of rising groundwater on the monolith; indicates that a High Density Polyethylene (HDPE) cover would have prevented rain infiltration and negated freeze-thaw concerns; and raises concerns about the limited data collected on the leachability of the monolith. The report goes on to present concerns about the frequency of Toxicity Characteristic Leachate Procedure (TCLP) analysis to determine the leachability of the monolith and states that some measurements during the design phase indicate a "high potential" for the monolith to leach if infiltrated by water.

3. *The revisions to the Shattuck remedy must be made in a very open and public process. USEPA must provide extensive opportunities for all stakeholders to provide input at every step. All interested parties, including the neighbors, the city, and other governmental agencies, must have the opportunity to understand*

the plans and standards that will be applied to this cleanup. The public must be involved at every step, and the concerns raised must be considered and addressed. Given the circumstances surrounding the Shattuck situation, it is imperative to build trust between the parties by providing public opportunities for input.

Response: USEPA intends to follow the NCP §300.430(f)(6) to ensure public involvement and to foster any trust which may have been built during the stakeholder dialogue process. After the ROD is signed, USEPA shall: (i) Publish a notice of the availability of the ROD in a major local newspaper of general circulation; and (ii) Make the ROD available for public inspection and copying at or near the facility at issue prior to the commencement of any remedial action. While we cannot commit to another dialogue process while we document this ROD amendment, we intend to participate in the community advisory group as established in Superfund program guidance. Our program guidance highly recommends even more active public involvement activities than the mandatory citation in the NCP. We encourage you to cooperate in the design of our public involvement plan as we direct our contractor to interview you for your project information and involvement needs.

4. *Comment: We attach documents we have submitted in the facilitated discussions and the Ombudsman's investigation dated May l998, through January 2000 to incorporate in the administrative record as public comment on this Proposed Plan. These documents state our views regarding the remedy and the problems we have identified with on-site disposal. We also request that the Working Draft FiveYear Review Report ("Five Year Review"), the Interim Evaluation Shattuck Chemical Company, NPL Site, Denver, Colorado dated September 23, 1999, by EPA's Environmental Response Team ("ERT Report") and all transcripts and exhibits submitted at the Ombudsman's three hearings on the Shattuck remedy all be incorporated in the administrative record.*

Response: We have placed your attachments into the administrative record and your comments appear in the responsiveness summary. The Working Draft of the Five-Year Review Report has been superceded by the final draft, which is already in the administrative record. Both documents have been placed in the administrative record. The ERT report has been placed in the administrative record when available. Transcripts and exhibits from the Ombudsman's hearings have also been placed in the administrative record.

5. *Comment: In order to adequately protect human health and the environment, radioactive waste must be disposed at a facility that is properly sited, properly*

designed to manage radioactive materials, with appropriate institutional controls, and where comprehensive monitoring can detect failures soon enough to protect public health and the environment. Only Alternative 3 meets these requirements to adequately protect human health and the environment. Because of its long half-life, the law requires that radioactive waste disposal facilities be designed to last 1000 years, if reasonably achievable, but no less than 200 years.

Response: Your comment places emphasis on the "adequacy" of Alternative 3 to protect human health and the environment. We don't agree that only Alternative 3 meets the requirements for siting, facility design, institutional controls, and timely failure detection. We have selected Alternative 3 because in the comparative evaluation, it best meets the NCP criteria which include all the requirements you feel are important.

6. *Comment: USEPA explained its regulations for control of uranium mill tailings from which the 1000 year requirement came this way: " The longevity (i.e., long-term integrity) of control is particularly important." 48 Fed. Reg. 595 (January 5, 1983). "We consider the single most important goal of control to be effective isolation and stabilization of tailings for as long a period of time as is reasonably feasible, because tailings will remain hazardous for hundreds of thousands of years." Id. at597.*

Only offsite removal to a facility properly sited and licensed to handle radioactive material meets these longevity requirements. The state and federal regulatory scheme for radioactive wastes establish siting and design criteria which are both necessary to provide protection over the longterm. Id., Colorado Rules and Regulations Pertaining to Radiation Control, RH 14.23, and Chapter 18, Appendix A, Criteria 1, 6 CCR 1007-1. No on-site remedy satisfies or can ever satisfy the siting criteria. Denver incorporates its siting criteria comments in "Denver's Technical, Regulatory, and Public Policy Rationale for Removal of the Shattuck Monolith" transmitted to Tim Fields by letter from Theresa Donahue dated October 15, 1999, at p. 2 (hereafter "Denver's Rationale for Removal"), Denver's "Considerations for the Shattuck Site" dated August 30, 1999 at pp. 2-5 (hereafter "Denver's Considerations for the Shattuck Site").

Response: Our comparative evaluation of the long-term protectiveness of the selected remedy leads us to believe that these longevity requirements are met with the greatest amount of certainty in the off-site disposal remedy.

7. *Comment: The Five-Year Review Report and the ERT Report show that the remedy as designed and built cannot protect human health and the environment*

over the long-term. The Environmental Response Team concluded that the cap of the monolith would probably fail within as little as thirty years and a "prolonged period (several years)" of dry weather is the "only scenario which will prolong the integrity of the present cap." Interim Evaluation Shattuck Chemical Company NPL Site, Denver, Colorado, Environmental Response Team, September 23, 1999 at p. 3 (hereafter "ERT Report"). The Five-Year Review experts also concluded that the cap was inadequate and at a minimum a high density polyethylene cover should have been used in addition to the clearly inadequate six inches of clay.

Response: We appreciate this comment and agree that both the ERT and Five-Year Review reports do indeed raise concerns about the present monolith cap design and configuration and question the long-term integrity and effectiveness of this cap. These findings have been incorporated into the ROD amendment for the site.

8. *Comment: The design and construction of the monolith also pose concerns for the protectiveness of the on-site remedies over the long term. EPA's ERT concluded that because the monolith is above grade it "would lend to the possibility of freeze-thaw mechanical weathering actions that may compromise the integrity of the cap or monolith." ERT Report at p. 1. The ERT found that "the potential for the monolith to leach if infiltrated by water is high." Id. At p. 3. The Five-Year Review Report, p. IV1, stated that "pilot-study leaching tests show that leachates from the monolith often exceed several groundwater standards, notably with respect to heavy metals."*

Response: The ERT Report findings were correctly reflected by this comment. The pilot-study leaching tests showed that leachates often exceeded maximum contaminant levels (MCLs) for molybdenum; antidegradation standards for State groundwater standards.

9. *Comment: The hazards of radioactivity are long-term, and require long-term maintenance, monitoring, and controls designed to last for at least 1000 years. Because we are dealing with radioactive contamination at Shattuck, protectiveness needs to be evaluated in terms of thousands of years. The needed maintenance, monitoring, institutional controls, and design are not possible at the existing location, and can only be provided at an offsite facility designed, licensed, and operated to manage radioactive materials. Options 1 and 2 leave the monolith in place and do not meet statutory or regulatory requirements designed to ensure long term protectiveness of remedies.*

EPA's preamble to the Uranium Mill Tailings Radiation Control Act regulations

sets forth the need to address long-term protectiveness. The need for long term protection over-shadows short-term cost factors. Only Alternative 3 can provide the long-term protection needed.

"...The hazard from uranium tailings must be viewed in two ways. In themselves, the tailings pose a present hazard to human health....the tailings are vulnerable to human misuse and to dispersal by natural forces for an essentially indefinite period. In the long run, this threat of expanded, indefinite contamination overshadows the present dangers to public health... " [US USEPA. Preamble to UMTRCA regulations found at 48FR592, dated January 5, 1983]

Response: This comment has been previously made in #5 and the response can be found there. We would say that your interpretation of the preamble citation is different from ours. The preamble seems to be saying that the long-term threat overshadows the present risk to public health. It doesn't seem to be saying anything about short-term cost factors.

10. *Comment: The monitoring system is inadequate to protect human health. The Colorado Rules and Regulations Pertaining to Radiation Control require that "The monitoring system must be capable of providing early warning of releases of waste from the disposal site before they leave the site boundary." RH 14.26.3, 6 CCR 1007-1. The regulations further require: "A buffer zone of land shall be maintained between any buried waste and the disposal site boundary...of adequate dimensions to carry out environmental monitoring activities...and take mitigative measure if needed." RH 14.25.1.8, 6 CCR 1007-1. And yet EPA's Five-Year Review concluded that "By the time any radionuclides and metals such as molybdenum and arsenic are detected, the chemical stability of the monolith will have been compromised. That is, there is no forewarning of incipient chemical failure of the monolith." Five-Year Review Report, p. VIII-4-5. EPA's Environmental Response Team also concluded that "There is no way of detecting whether this or any other cap failure is occurring until a collapse or breakout has occurred." Interim Evaluation, Environmental Response Team, p.3.*

Response: Although monitoring systems per se have never been able to "protect" human health, they are designed to provide data which must be interpreted to determine whether engineering controls are working as designed. The State regulations you cite do not specify how responsive an early warning system must be nor what dimensions a buffer zone must be. We do stand by the findings of the Five-Year Review and agree that the current remedy may not be capable of providing forewarning of incipient chemical failure of the monolith. For that and other reasons, we have selected the off-site disposal

remedy instead of retrofitting the design of the monolith monitoring system.

Regarding the ability of the monolith monitoring system to provide early warning of releases, the design of the monitoring system considered the ability of the system to meet this requirement. The 1997 plume monitoring plan (Harding Lawson Associates) contains results of modeling of the effectiveness of the downgradient well configuration. This analysis shows a very high probability that a release from the monolith would be detected by a downgradient monitoring well. The results of this analysis show that the monitoring system complies with the requirements of RH 14.26.3. Of course, it cannot be guaranteed that a release will be detected. This fact should be considered in the context of general monitoring system design, that no monitoring system is 100 percent effective. The record shows, however, that the design of the monolith monitoring plan complies with RH 14.26.3 as well as could be expected.

Furthermore, Alternatives 1 and 2 comply with the requirement that an adequate buffer zone be maintained. The monolith configuration maintains a twenty (20) foot distance between the edge of the stabilized soil and the property boundary. This distance is adequate for the installation of any mitigative measures that may be required. The Commentor has expressed concern regarding the feasibility of implementing mitigative measures in the narrow corridor between the edge of the monolith and the site boundary. Case histories of projects where similarly narrow working areas existing suggest that such a project is feasible. These include construction of a groundwater barrier/collection system in a 30 ft wide corridor (Haley and Aldrich (1994)), and installation of a polymer slurry wall into flood control dikes with a top width of 14 feet (Bureau of Reclamation (1994)).

11. *Comment: Only removal to an offsite facility will protect groundwater now and in the future by removing the source of contamination. The current monolith is designed to rest within four feet of groundwater with no liner in between, does not protect groundwater now, and cannot protect groundwater from contamination in the long term.*

Response: We agree that off-site removal will remove the source for any future potential contamination of the groundwater. Any further groundwater protection strategy statements must be deferred until we obtain supplemental field investigation data.

12. *Comment: The Proposed Plan's conclusion that all the alternatives would meet*

their respective ARARs is unsupportable and shows a complete lack of analysis or an arbitrary picking and choosing of ARARs that the three remedies would have to meet. ARARs are merely the efforts of regulators and lawmakers to put into statute or regulation those standards deemed necessary to protect human health and the environment. The ability of a remedy to meet the ARARs is a means to measure whether the remedy can protect human health and the environment. Failure of a remedy to meet these standards means the remedy fails to meet both of the two threshold criteria that the National Contingency Plan requires every chosen remedy to meet. The components of laws and regulations that must be met to make a remedy protective for hundreds or thousands of years include: requirements for full investigation of degree and extent of contamination, proper siting, adequate design, good construction practices, effective institutional controls, and comprehensive monitoring. The current onsite remedy (Alternative 1) does not meet ARARs and in some cases can never meet ARARs. A modified onsite remedy (Alternative 2) may address some of the shortcomings of the onsite remedy but an onsite remedy will never be able to meet siting requirements of the law or address other shortcomings. Alternative 3, offsite disposal at a facility sited, designed and licensed for disposal or handling of radioactive waste is the only remedy that can meet ARARs.

Response: While legally applicable requirements must be attained, compliance with relevant and appropriate requirements will vary depending on factors such as the duration of the response action, the form or concentration of the chemicals present, the nature of the release, the availability of other standards that more directly match the circumstances at the site, and other factors (40 CFR 300.400(g)(2)). In some cases only a portion of the requirement may be relevant and appropriate. Only those requirements that are considered both relevant and appropriate must be addressed at CERCLA sites. USEPA policy is to comply with ARARs throughout the response action at all potential points of exposure, and to meet any TBC standards necessary for protection of human health and the environment. Requirements that are developed by a local or regional body and are both promulgated and legally enforceable by the state may, however, also serve as ARARs.

Application of Superfund guidance on ARARs compliance, which is available as EPA540-R-98-020 or OSWER 9205.5-10A or PB98-963 228, follows. The guidance provides for balancing of the following considerations:

- **the basic purpose of the requirement;**
- **any adverse effect on the ability of the response action to protect human health and the environment if the requirement were not met;**

- **the existence of other requirements (i.e. CERCLA procedures) at the site that would provide functionally equivalent compliance; and**
- **classification of similar or identical requirements as substantive or administrative in other CERCLA situations.**

The government ownership requirement is found in the State low-level radioactive waste disposal site regulations (Colorado Rules and Regulations about Radiation Control, Part 14, "Licensing Requirements for Land Disposal of Low Level Radioactive Waste") and also in UMTRCA. Both of these regulations have been determined not to be applicable to the Site. USEPA assumed the requirement was substantive rather than merely an administrative requirement. The government ownership requirement can be considered relevant to the Site because it addresses situations similar to the on-site remedy, i.e. disposal of radioactive waste. However, USEPA found the requirement not appropriate for this Site because other mechanisms can achieve the same purpose. The Shattuck property owner can be required to implement institutional controls which will maintain control at the Site to ensure that the containment remedy is protected.

13. *Comment: In the January 28, 1992 ROD, the primary regulation was considered to be the Uranium Mill Tailings Radiation Control Act, or UMTRCA. UMTRCA and the equivalent Colorado state regulations, Rules and Regulations Pertaining to Radiation Control, have extensive criteria for a disposal facility that will be protective for the 200 to 1000 years required by law. The regulations clearly state that the siting criteria and design criteria must go hand-in-hand to ensure the disposal site remains protective in the long term. Because the siting criteria require sites to be isolated and remote from populated areas, only Alternative 3 can meet these siting and design criteria.*

Response: We have reviewed UMTRCA for its standards on siting criteria and can find no specific citations for what constitutes isolation or remoteness from populated areas. In addition, these regulations only require that isolation and remoteness be considered in siting facilities.

14. *Comment: Section 121 of CERCLA includes as ARARs that must be met by selected remedies: "any promulgated standard, requirement, criteria, or limitation under State environmental or facility siting law . . ." Facility siting requirements must be met, are ARARs for the Shattuck site, and are necessary for a protective remedy. The siting criteria include the need to isolate the wastes, and the need to locate wastes so that it is not impacted by future development, and so that it is remote from populated areas. Alternatives 1 and 2 would not meet the*

siting criteria ARARs, which can only be met by Alternative 3.

Response: We agree on what CERCLA says about how alternatives must meet ARARs. But we know of no State facility siting laws that discuss siting criteria as specifically as you assert. We would agree that when siting any kind of waste management facility, isolation, avoidance of impact from future development, and remoteness from population areas are sound general principles.

15. *Comment: Criterion 1A from the Colorado Rules and Regulations Pertaining to Radiation Control describes requirements for isolation of wastes, and is an ARAR at the Shattuck site. These siting criteria requirements are directly opposed to locating a radioactive waste disposal dump in an urban area. An urban area, with its existing population and population growth, variety of development patterns, and intense human activity, is no place for long-term radioactive waste disposal, as recognized in federal and state regulations. The Five-Year Review concluded "Shattuck is a unique situation because it is the only radiation waste repository set in a major metropolitan area in the United States." Five-Year Review at p. VI-6. Only Alternative 3 can meet the requirements of Criterion 1A.*

Criterion 1A. "The general goal ... in siting and design decisions is permanent isolation of tailings and associated contaminants by minimizing disturbance and dispersion by natural forces, and to do so without ongoing maintenance.... The following site features ... must be considered in selecting among alternative tailings disposal sites or judging the adequacy of existing tailings sites:

(1) Remoteness from populated areas;

(2) Hydrologic and other natural conditions as they contribute to continued immobilization and isolation of contaminants from ground-water sources; and

(3) Potential for minimizing erosion, disturbance, and dispersion by natural forces over the long-term." Appendix A, Part 18, Colorado Rules and Regulations Pertaining to Radiation Control, 6 CCR 1007-1.

Response: We agree that the site features which you have discussed will contribute to the goal or objective of isolating these kinds of radioactive materials and must be considered in selecting among alternatives or judging the adequacy of existing sites. However these requirements do not prohibit location in an urban area. It is not USEPA policy to select radioactive material disposal sites which are near populated areas or groundwater sources.

Criterion 1A states, as quoted by the Commentor, that "[t]he general goal or broad objective in siting and design decisions is permanent isolation of tailings and associated contaminants by minimizing disturbance and dispersion by natural forces, and to do so without ongoing maintenance." Alternatives 1 and 2 would be able to meet the general goal of this criterion in the near term as the treated materials on site a re designed to be resistant to natural degradation processes. As described in the Proposed Plan, there is some uncertainty as to the ability of Alternatives 1 and 2 to meet the intent of Criterion 1A in the long term, specifically with regards to long term maintenance. Criterion 1A goes on to say that "[t]he following site features must be considered in selecting among alternative tailings disposal sites...", and the three sub-criteria are then listed. This language does not state or even imply that the three sub-criteria are requirements which must be met. The only requirement is that these three criteria be considered. The record of the original ROD clearly shows that these criteria were considered. Alternatives 1 and 2 would therefore comply with this ARAR, but, as noted, future compliance with the intent of Criterion 1 is uncertain.

16. *Comment: Criterion 1 C from the Colorado Rules and Regulations Pertaining to Radiation Control describes the emphases that must be placed on siting and isolation of tailings, and is an ARAR at the Shattuck site. Only Alternative 3 can meet the requirements of Criterion l C.*

Criterion lC.

"In the selection of disposal sites, primary emphasis must be given to isolation of tailings or wastes, a matter having long-term impacts, as opposed to consideration only of short-term convenience or benefits, such as minimization of transportation or land acquisition costs. While isolation of tailings will be a function of both site and engineering design, overriding consideration must be given to siting features given the long-term nature of the tailings hazards." Appendix A, Part 18, Colorado Rules and Regulations Pertaining to Radiation Control, 6 CCR 1007-1.

Response: We agree that the siting features in the State criteria statement will contribute to the goal or objective of isolating these kinds of radioactive materials and must be considered in selecting among alternatives or judging the adequacy of existing sites. We agree that only Alternative 3 meets the overriding consideration being assigned to siting features in this identified ARAR. That is why we have chosen Alternative 3 as the selected remedy.

Criterion 1C requires that primary emphasis be given to isolation of wastes. The record for the original ROD shows that isolation of wastes was indeed the primary emphasis. Therefore, Alternatives 1 and 2 would meets this ARAR. Criterion 1C goes on to say "...overriding consideration must be given to siting features..." The term "overriding consideration" is somewhat ambiguous in this context. Regardless of how this term is interpreted, the record shows that the suitability of Alternatives 1 and 2 and the suitability of the Bannock Street site for disposal has been thoroughly considered. Alternatives 1 and 2 would therefore comply with this ARAR.

17. *Comment: Part 14 of the Colorado Rules and Regulations Pertaining to Radiation Control describes requirements for disposal site suitability, and is an ARAR at the Shattuck site. Only Alternative 3 can meet the requirements of this section.*

RH 14.23 Disposal Site Suitability Requirements for Land Disposal.

"Primary emphasis in near-surface disposal site suitability is given to isolation of wastes, and to the disposal site features that ensure that the long-term performance objectives are met." RH 14.23. 1

"Within the region where the facility is to be located, a disposal site should be selected so that projected population growth and future developments are not likely to affect the ability of the disposal facility to meet the performance objectives of this part." RH 14.23. 1.2. Part 14, Colorado Rules and Regulations Pertaining to Radiation Control, 6 CCR 1007-1.

Response: We agree that Alternative 3 best meets this criteria; however, either Alternatives 1 and 2 could meet the cited performance objectives if protected by institutional controls which would restrict population growth and future developments. We also admit that State and local governments do not appear to be willing or able to implement the kinds of institutional controls which are needed to isolate the wastes.

RH 14.23 requires that primary emphasis be given to isolation of the wastes. The record for the original ROD shows that isolation of the waste was the primary concern during the Remedial Design phase. RH 14.23 goes on to say that "a disposal site should be selected so that projected population growth and future developments are not likely to affect the ability of the disposal facility" to meet performance objectives. Since Alternatives 1 and 2 would prohibit future development of the property they would adequately meet the preference

for sites where future population growth or development will not affect the performance of the remedy. Alternatives 1 and 2 therefore comply with this ARAR.

18. *Comment: Disposal of low-level radioactive waste at the Shattuck site violates the Rocky Mountain Low-Level Radioactive Waste Compact. USEPA sought and received approval from the compact board to ship large quantities of the Denver radium waste from other operable units to the Envirocare facility in Clive, Utah. Because Article 7 of the Compact prohibits the disposal of non-DOE low-level radioactive waste generated within the compact region except at a "regional facility," the disposal of radioactive waste at Shattuck violates the compact. Alternatives 1 and 2 both violate the Compact, only Alternative 3 can meet the requirements of the Rocky Mountain Low-Level Radioactive Waste Compact.*

Response: See the response prepared for a similar comment from the RMLLRWC.

19. *Comment: The Uranium Mill Tailings Radiation Control Act "requires the federal government to acquire and retain control of these tailings disposal sites under licenses issued by the Nuclear Regulatory Commission (NRC)." 42 U.S.C. § 7914. This same requirement is included in Colorado law that has been designated as ARARs at the Denver Radium Site. §25-11-103, C.R.S., 6 C.C.R. 1007-1, Part 18, Appendix A, Criterion 9. "Title to the byproduct material licensed under this Part 18 and land ... must be transferred to the United States or the State in which such land is located ..." Appendix A, Part 18, Criterion 9C. Colorado Rules and Regulations Pertaining to Radiation Control. One of the reasons for rejecting the on-site remedies at OUs I, II, III, IV, IV, VI, IX, X, and XI was that "[t]his remedial action alternative would require long-term government ownership, licensing and management and monitoring to protect the integrity of the facility." Alternatives 1 and 2 cannot meet this requirement. Only Alternative 3 can meet this requirement.*

Response: We don't think that this particular criterion under the Part 18 State regulations is relevant and appropriate here because all the licensed material, i.e. the byproduct material subject to the State license SMB-479, was removed from the site and the license was terminated.

20. *Comment: There is no exemption in the statutes or the regulations that allows property owners to own permanent disposal sites because all owners but the government were considered too transitory to be able to exercise control over 200 to 1000 years. In the preamble to the regulations implementing UMTRCA,*

USEPA explained the rationale for government ownership as follows:

"Section 104 of the Act requires the Federal Government to acquire and retain control of these tailings disposal sites.... As long as the Federal Government exercises its ownership rights and other authorities regarding these sites, they should not be systematically exploited by people or severely degraded by natural forces.

We believe that these institutional provisions are essential to support any project whose objective is as long term as are these disposal operations, and for which we have little experience." US USEPA. Preamble to UMTRCA regulations found at 48FR597, dated January 5, 1983

Response: Our best response is to repeat portions of an earlier response regarding what we believe ARARs to be. Whether or not a requirement is appropriate (in addition to being relevant) will vary depending on factors such as the duration of the response action, the form or concentration of the chemicals present, the nature of the release, the availability of other standards that more directly match the circumstances at the site, and other factors (40 CFR 300.400(g)(2)). In some cases only a portion of the requirement may be relevant and appropriate. Only those requirements that are considered both relevant and appropriate must be addressed at CERCLA sites.

21. *Comment: Colorado Hazardous Waste Regulations 6 CCR 1007-3, parts 260, 261, and 262.11 requiring waste characterization were identified in the 1992 ROD as ARARs. The 1992 ROD states that "TC testing will be performed during excavation to evaluate whether hazardous wastes are present." The EPA's Environmental Response Team found that "The sampling frequency of the mix for TCLP analysis was inadequate . . . As a result of the lack of representative sampling and the variability of the waste stream (organic, heavy metals, radioactives, amphoterics, etc.), one cannot get an accurate estimate of the leaching of the monolith from the present data." ERT Report at p. 4. Because the wastes were not sufficiently characterized for the initial placement of the monolith, only Alternative 3 can meet these requirements. The waste must be characterized to determine its chemical constituents and their concentrations for both total metals and TCLP levels on a routine basis.*

Response: We agree that the ERT report concludes that the report author could not assess monolith leachability from the data he reviewed. Subsequent to the 1992 ROD, but prior to excavation and stabilization of the contaminated soil, contaminated soil was obtained for the pilot scale treatibility tests. The

pilot scale treatibility tests consisted of construction of four small monoliths using equipment and processes similar to those planned for the full scale stabilization. TCLP tests were performed on the soil selected for the pilot scale treatibility tests prior to performance of the treatibility tests. A total of three samples from the 500 yards of treatibility test soil were subjected to the TCLP tests. The highest TCLP results from these tests are presented below, with the TCLP limits for comparison:

Parameter	TCLP from Treatibility Study (mg/l)	TCLP Limit (mg/l)
Arsenic	0.025	5.0
Barium	1.12	100
Cadmium	0.008	1
Chromium	0.002	5
Lead	0.02	5
Mercury	0.0001	0.2
Selenium	0.025	1.0
Silver	0.005	5.0

These results demonstrate that the soil selected for the treatibility study was well below regulatory levels for TCLP. These results show that the waste was not a characteristic hazardous waste.

There has been some concern raised regarding the representativeness of the soil selected for TCLP testing as part of the treatibility study. To address this issue, CDPHE reviewed the soil sampling results from the 1990 Remedial Investigation Report Appendix B, and compared total concentrations of the eight Resource Conservation and Recovery Act (RCRA) metals found during the RI to those in the TCLP samples from the treatibility study. For six of the eight RCRA metals, total concentrations from the treatibility study sample for elevated soil (worst case) fall at or above the mode (most common value) of the total concentrations for the same metals from all soil samples analyzed for the RI. For two RCRA metals, silver and cadmium, the total concentration from the elevated soil treatibility sample fell below the mode of the concentrations from the RI samples. For both of these metals, the order of magnitude of the total concentrations from the treatibility sample was the same as total concentrations from the RI. This suggests that the soil from the treatibility sample was similar to the soil sampled during the RI. Furthermore, the above

table shows that TCLP values for cadmium and silver are far less than the TCLP standards. These specific data suggest that soils that would fail TCLP for cadmium and silver were not present at the site. And when all of the TCLP and total concentration data are considered as a whole, it is clearly shown that the soils placed in the monolith were not characteristic hazardous waste.

Aside from the chemical characterization of the soil prior to stabilization, the administrative characterization of the waste would also preclude it from being defined as hazardous waste. The Colorado Hazardous Waste Regulations, Section 261.2 (a) (4) excludes from the definition of solid waste by-product material as defined by the Atomic Energy Act of 1954. Historical records (HAER CO-71) show that a significant -- though unquantified -- portion of the Shattuck waste meets the AEA definition of by-product material. Furthermore, Section 261.4 (b) (7) of the Colorado Hazardous Waste regulations define as solid waste but exclude from definition as hazardous waste those wastes generated from the extraction, beneficiation, and processing of ores and minerals. The historical record of activities that took place at the Shattuck facility indicates that most if not all of the wastes generated would fall under this definition. These conclusions are further supported by letters from the USEPA dated September 19, 1984 and October 31, 1994 (copies attached).

22. *Comment: Chemical analysis must be provided for not only the radioactive constituents, but other metals indicated by the materials handling and processing records for the Shattuck property. Written documentation must be established that describes the factors evaluated and decisions made regarding hazardous waste determinations.*

Response: We think that the treatability reports provide written documentation of the factors evaluated and the hazardous waste determinations made. As noted above, the stabilized waste on site is not hazardous waste, and therefore the design requirements for hazardous waste disposal facilities are not ARARs.

23. *Comment: Colorado Hazardous Waste Regulations 6 CCR 1007-3, part 264 includes extensive design requirements. At minimum, two liners with leachate collection are required. For any wastes determined to be hazardous, these design requirements are ARARs. Only Alternative 3 can meet these requirements.*

Response: None of the wastes treated in the monolith was determined to be hazardous, so these particular minimum technology requirements in the State RCRA regulations are neither relevant nor appropriate.

24. *Comment: Solid Waste Disposal Act Regulations 6 CCR 1007-2 establishing engineering design and closure standards "would apply to on-site disposal of solid waste." Liners are generally required at solid waste disposal facilities. The Solid Waste Disposal Act Regulations are ARARs for the site. Only Alternative 3 can meet the requirements of the Solid Waste Disposal Act Regulations.*

Response: The Solid Waste Regulations which were in effect at the time of the 1992 ROD were the November, 1991 revision. A review of the requirements of the 1991 Solid Waste Regulations shows that the current remedy complies with the applicable requirements of this regulation, specifically those requirements contained in Section 2 Minimum Standards and Section 4 Standards for New Facilities. Neither Section 2 or Section 4 of the 1991 regulations require that solid waste disposal facilities include a liner. The current (April, 1999) Solid Waste Regulations contain requirements for all solid waste disposal facilities, as codified in Section 2 Minimum Standards. The Minimum Standards contain requirements such as control of odors, runon and runoff control, and groundwater monitoring. Alternatives 1 and 2 comply with the Minimum Standards. The requirement for a liner to which the Commentor refers is contained in Section 3 of the regulations, which consists of requirements specific to municipal solid waste landfills. Section 3 is also applicable to non-MSWLF facilities, but allows for a case-by-case application of the requirements. Given analogous past application of the requirements of Section 3, it is doubtful that a liner would be required at the Shattuck site.

25. *Comment: Section 121 of CERCLA requires that all applicable, relevant and appropriate requirements and standards be met at the time of remedy completion. USEPA has determined that Maximum Contaminant Levels (MCLs) and the statewide standards contained in the Colorado Basic Standards for Groundwater (5 CCR 1002-8, Section 3.11.0) are relevant and appropriate standards for groundwater at the Shattuck site. In order to comply with the statute, the remedy must meet MCLs at the waste boundary. The groundwater both on and offsite exceeds these standards. The Five-Year review indicated that this will be a continuing problem. "However, pilot-study leaching tests show that leachates from the monolith often exceed several groundwater standards, notably with respect to heavy metals." Five-Year Review Report, p. IV- 1. Alternatives 1 and 2 do not and cannot meet MCLs at the waste boundary. Only Alternative 3 can provide that MCLs and Colorado Basic Standards for Groundwater be met. We incorporate the more detailed discussion of this issue contained in Denver's Considerations for the Shattuck Site at pp.7-10.*

Response: MCLs are not ARARs for these alternatives because this ROD

Amendment deals only with the monolith, not groundwater.

26. *Comment: The groundwater at and around the Shattuck site has the potential for use as drinking water. The presence of private water supply wells in the Overland Park neighborhood indicates that the alluvium aquifer has been and can be used as a water supply. Several private wells exist in the neighborhood to the west just south of the Overland golf course. Denver has also located well logs for three wells appearing to be in the downgradient flowpath of the Shattuck plume. Two of the wells are open to the bedrock aquifer and were used for both drinking water and cooling water. If the offsite plume extends to the east beyond South Acoma Street, Denver Environmental Health has records of additional wells that may be impacted by the plume. Requirements of "remedial actions for ground or surface waters that are current or potential sources of drinking water" are further clarified in the preamble to the NCP, as follows:*

"CERCLA sets out a mandate for remedies that are protective of use of ground water by private or public users. For example, section 104(c)(6) reflects Congress's expectation that ground water should be restored to protective levels. If ground water can be used for drinking water, CERCLA remedies should, where practicable, restore the ground water to such levels. Such restoration may be achieved by attaining MCLs or non-zero MCLGs in the ground water itself, excluding the area underneath any waste left in place. Thus these standards and goals may appropriately be used as cleanup levels in the ground water..." Excerpt from the preamble to the NCP, Thursday, March 8, 1990, p. 875

Response: We appreciate this comment and agree that the groundwater resource has the potential for use as a drinking water supply source. The scope and role of the proposed plan addresses the monolith and any untreated contaminated soils. We have deferred any further reconsideration of the groundwater component of the original remedy until after we conduct a supplemental remedial investigation, collect additional groundwater data, and update the site conceptual model.

27. *Comment: The processes and/or methods by which the remedy will ensure that groundwater be restored to protective levels must be specified clearly in the ROD.*

Response: The scope and role of the proposed plan addresses the monolith and any untreated contaminated soils. This ROD amendment does not address groundwater restoration. We have deferred any further reconsideration of the groundwater component of the original remedy until after we conduct a supplemental remedial investigation, collect additional groundwater data, and

update the site conceptual model. The current version of the Colorado Basic Standards and Methodologies for Surface Water is codified as 5 CCR 1002-31. We agree that degradation of surface water below the designated standards is not allowed under these regulations. The degree to which groundwater from the Shattuck site may be impacting the South Platte River and causing exceedances of the designated standards is not clear at this point. As indicated in the Proposed Plan, review of groundwater related issues is not within the scope of this ROD amendment. Further review of the possible impact on the river will occur under a separate process.

28. *Comment: The Colorado Basic Standards and Methodologies for Surface Water (5 CCR 1002-8, Section 3.1.0) establish basic standards and an anti-degradation standard and are applicable for any surface water impacts. The degree to which Shattuck groundwater discharge is impacting the South Platte River must be determined and remediated as required by the Colorado Basic Standards and Methodologies for Surface Water. The processes and methods by which this will be accomplished must be clearly specified in the ROD.*

Response: We agree that this State regulation is an ARAR for the groundwater remedy. The scope and role of the proposed plan addresses the monolith and any untreated contaminated soils. This ROD amendment will not address groundwater restoration. We have deferred any further reconsideration of the groundwater component of the original remedy until after we conduct a supplemental remedial investigation, collect additional groundwater data, and update the site conceptual model.

29. *Comment: No waste load evaluation was completed to evaluate the contribution of the groundwater to the South Platte River. Federal regulations at 40 C.F.R. Part 130 Section 7(c)(i) require that total maximum daily loads (TMDLs) and individual water quality-based effluent limitations "shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS [water quality standards] with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. Determinations of TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters."*

Response: The scope and role of the proposed plan addresses the monolith and any untreated contaminated soils. This ROD amendment does not address groundwater restoration. We have deferred any further reconsideration of the groundwater component of the original remedy until after we conduct a

supplemental remedial investigation, collect additional groundwater data, and update the site conceptual model. We expect the update to the site conceptual model to quantify a waste load evaluation of the contaminated groundwater contribution to the South Platte.

30. *Comment: EPA's draft proposal, Identifying Impaired Waters, Establishing TMDLs, includes in the summary pages that USEPA is proposing clarifying revisions to the current definition of"load allocation." Proposed section 130.33(b)(6) "clarifies that load allocations may contain allocations to categories, subcategories, or individual sources and adds a requirement that natural background, atmospheric deposition, and other nonpoint source loads must be separately allocated where possible. The ability, to allocate loads to a category of nonpoint sources is not, however, intended to allow such grouping where it is feasible to allocate loads to individual sources of a pollutant." In the State of Colorado's 1998 303(d) list submitted to USEPA, segment 14 of the South Platte River Basin (primarily the South Platte in Denver County) was identified as an impaired segment for three parameters. Two of these, nitrate and manganese, are constituents of concern in the Shattuck contaminated groundwater plume. The degree to which the Shattuck groundwater discharge is contributing nitrate and manganese to the South Platte River must be determined and remediated. The processes and methods by which this will be accomplished must be clearly specified in the ROD.*

Response: We agree on what CERCLA says about how alternatives must meet ARARs. But we know of no State facility siting laws that discuss siting criteria as specifically as you assert. We would agree that when siting any kind of waste management facility, isolation, avoidance of impact from future development, and remoteness from population areas are sound general principles.

31. *Comment: Colorado Rules and Regulations Pertaining to Radiation Control require that: "A buffer zone of land shall be maintained between any buried waste and the disposal site boundary... of adequate dimensions to carry out environmental monitoring activities...and take mitigative measures if needed." RH 14.25.1.8, 6 CCR 1007-1, Colorado Rules and Regulations Pertaining to Radiation Control. At Shattuck, there is no room for adequate monitoring or mitigative measures before contaminants leave the site boundary, so Alternatives l and 2 cannot meet regulatory monitoring requirements. The waste must be managed at a facility where adequate environmental monitoring activities can be conducted. Only Alternative 3 can meet this regulatory requirement.*

Response: We disagree that there is no room for adequate monitoring. Although the waste unit takes up almost all the available surface area of the private property, there was still a sufficient zone around the perimeter to install and service the monolith monitoring wells. Mitigative measures such as slurry walls and extraction trenches could be installed outside the fencelines within the right-of-way for the railroad and easements on the Camas property.

32. *Comment: Radiation control regulations require that "The monitoring system must be capable of providing early warning of releases of waste from the disposal site before they leave the site boundary." RH 14.26.3, 6 CCR 1007-1, Colorado Rules and Regulations Pertaining to Radiation Control. The Environmental Response Team concluded that "There is no way of detecting whether this or any other cap failure is occurring until a collapse or breakout has occurred." ERT Report at p. 3. The Five-Year Review also found that the monitoring at the Shattuck site could not meet these regulatory requirements: "Unfortunately, by the time any radionuclides and metals...are detected, the chemical stability of the monolith will have been compromised. That is, there is no forewarning of incipient chemical failure of the monolith." Alternative 1 does not meet this ARAR. Alternative 2 cannot meet this ARAR because there is insufficient buffer property on which to construct an effective monitoring system that will give you early warning of remedy failure. The waste must be managed at a facility where adequate environmental monitoring activities can be conducted. Only Alternative 3 can meet this regulatory requirement.*

Response: We think there is a difference between an indication of incipient chemical failure of the monolith stabilization matrix and early warning of releases of waste from the disposal unit as required by the identified ARAR. The monolith monitoring system has been shown to be 95% effective in capturing any contamination migration, but we agree that the current monitoring plan was not designed to provide data on the decomposition or degradation of the cement/flyash stabilization technology. Regarding the citations from RH 14.22, RH 14.24.1.1, and RH 18 Appendix A Criterion 1D, it is noted that the regulations express a preference for facilities which do not require long term maintenance. Although the Alternatives 1 and 2 are not expected to require active maintenance in the short term, the long term maintenance requirements are uncertain. For this reason, Alternatives 1 and 2 were rejected, and Alternative 3 was selected as the preferred alternative.

33. *Comment: Both the current remedy (Alternative 1) and the enhanced on-site remedy (Alternative 2) are inherently and fatally flawed because they will require on-going active maintenance to accomplish even their limited effectiveness.*

EPA's Environmental Response Team recommended: "If waste is to remain on-site, steps should be taken to address the lack of a system to assess the integrity of the cap. A system should be designed and integrated with an active cap maintenance program to assure that no penetration of the cap occurs." ERT Report at p.4. Even a modified cap as contemplated by Alternative 2 would require on-going maintenance according to the Environmental Response Team: "It may be easier to modify the cap . . . If chosen, a series of monitoring points should be installed under the HDPE liner to assess whether water is penetrating the liner . . . When water is detected, repair of the liner would then be instituted." The Environmental Response Team also recommended a surface run-off containment system be added to the remedy, which would require ongoing maintenance. ERT Report at p.5. The Five Year Review concluded that the monolith itself was likely to degrade over time and the Claymax cover was likely to shrink both of which would require maintenance or an entire removal. Five Year Review at pp. VIII 2-4, 12-14. Colorado regulations, identified as ARARs, require the disposal facility to be sited and designed to "eliminate, to the extent practicable, the need for ongoing active maintenance of the disposal site following closure so that only surveillance, monitoring or minor custodial care are required." RH 14.22. Site design features shall be directed toward long-term isolation and avoidance of the need for continuing active maintenance after site closure. RH 14.24.1.1. "Tailings should be disposed of in a manner that no active maintenance is required to preserve conditions of the site." Criterion ID, Appendix A, Part 18. 6CCR 1007-1.

Response: We acknowledge the inconsistency about active maintenance programs between the ERT report and the identified State ARAR. We have changed our preliminary conclusion reached in the proposed plan that Alternatives 1 and 2 meet the requirement to eliminate the need for an ongoing active maintenance program. We are convinced by your comment and others that this ARAR cannot be met by Alternative 1 and possibly by Alternative 2.

34. *Comment: Denver Revised Municipal Code contains requirements to address environmental remediation and construction activities in general. These requirements must be considered and met during any remedial activities, and are presented in the attached table. The table is not intended to be inclusive of all Denver requirements. Due to the ambiguities contained within the Proposed Plan, we are unable to completely identify all Denver requirements and reserve the right to identify and provide additional Denver regulations in the future.*

The USEPA and the State of Colorado should have identified the necessary federal and state ARARs associated with the preferred alternative. However,

these ARARs have not been made available to the city for review, so we are unable to determine whether the identified ARARs are comprehensive. We request the opportunity to review and comment about the proposed list of ARARs.

Response: The Denver Revised Municipal Code requirements are not ARARs for on-site response actions authorized under the NCP unless they are both promulgated and legally enforceable by the State. We agree that USEPA should have done a better job of ARARs analysis before publishing the proposed plan. We did not make the ARARs available because of our interest in expediting the course of action arrived at through the stakeholder dialogue process. We will make every effort to comply with local regulations, although CERCLA does not require us to do so.

35. *Comment: Due to the lack of specific information within the Proposed Plan, we reserve the right to identify additional state and federal requirements for the environmental remediation as plans become available.*

Response: USEPA does not recognize this reservation of rights because no such right exists under CERCLA, but we expect the City to participate in the community advisory group. In that forum more specific information will be discussed and the opportunity to identify state and federal requirements, and City concerns, will be available.

36. *Comment: The draft Record of Decision must be provided for review and comment. Denver wants to know up front how issues raised during this comment period will be addressed.*

Response: The NCP process requires us to address your significant comments in this responsiveness summary.

37. *Comment: The draft Record of Decision must include details on design, regulations, and performance standards to be met for the implementation of the remedy. These performance standards must include specifications for the identification of contaminated material to be removed, and clarification of residual risks are posed to public health or the environment by any remaining contamination. The previous ROD did not provide sufficient detail on design requirements, performance standards, ARARs, nor address many contaminants. The draft Record of Decision must also clearly address remaining long-standing and long-term concerns such as how groundwater and surface water contamination will be addressed, and spell out the process by which these concerns will be addressed.*

Response: The ROD amendment documents the major change to the original remedial action for a site or operable unit. It is prepared by the lead agency in consultation with the support agency. The ROD amendment serves as: (1) A legal document in that it certifies that the remedy amendment process was carried out in accordance with CERCLA and, to the extent practicable, in accordance with the NCP; (2) A substantive summary of the technical rationale and background information contained in the Administrative Record file (e.g., Final Five-Year Review Report); (3) A technical document that provides information necessary for determining the conceptual engineering components, and which outlines the remedial action objectives and cleanup levels for the Selected Remedy; and (4) A key communication tool for the public that explains the contamination problems the remedy amendment seeks to address and the rationale for its selection. Based upon our experience, we expect you will find the document lacking the details on design, regulations, and performance standards. Such details are more appropriate for the design development process which follows the ROD signature. In addition, the scope and role for this ROD amendment will not address groundwater and surface water concerns per se, nor will it spell out the process to address those concerns. We have already stated that we are conducting a supplemental RI/FS process to collect additional site data and update our site conceptual model.

38. *Comment: The amended ROD and subsequent design documents and work plans must address performance standards for all contaminants, not just radioactivity and a few metals. The contaminants released at the site present radioactive, toxic and carcinogenic hazards. Radioactive contaminants include gamma, radon, Radium-226, Thorium-230, Lead-210, Uranium (natural). The attached seven tables, copied from the Baseline Risk Assessment, dated March 1991, list additional inorganic and organic contaminants attributed to the site. The tables list:*

Inorganics sampled in soils Inorganics sampled in groundwater - alluvium Inorganics sampled in groundwater - bedrock volatile organics sampled in soils volatile organics sampled groundwater semi-volatile organic chemicals sampled in soil semi-volatile organic chemicals sampled in groundwater

As can be seen from a comparison of the contaminants of concern listed in the current ROD with those listed in these tables, numerous other chemicals and/or compounds were dropped from further consideration under the current remedy without adequate justification. For example, high concentrations of nitrate-

nitrite, ammonia, molybdenum, and copper have impacted the soils and groundwater and potentially are degrading the water and sediments of the South Platte River. These contaminants are exceeding water quality standards in the impacted storm water sewer discharge to the River. Dr. Wendy Harrison of the Five-Year Review team, expressed significant concern regarding the inadequacy of sampling data for metals and about the subsequent elimination of non-radioactive elements by the Risk Assessment. These and the other contaminants released from Shattuck to soils and groundwater must be reconsidered and addressed by the remedy. Adequate justification must be provided for all contaminants that are contained in the above lists yet removed from the contaminant of concern list.

Response: We are conducting a supplemental field investigation process to collect additional site data and update our site conceptual model where any additional contaminants of concern may be proposed. Your concern expressed in this comment is not within the scope and role of this ROD amendment action.

39. *Comment: The previous ROD did not provide sufficient detail on design requirements, performance standards, ARARs, nor address many contaminants. The draft Record of Decision must also clearly address remaining long-standing and long-term concerns such as how groundwater and surface water contamination will be addressed, and spell out the process by which these concerns will be addressed.*

Response: The NCP process requires us to address significant public comments in this responsiveness summary.

40. *Comment: All of the design documents must be made available for review and comment in draft form. As EPA's Five-Year Review experts pointed out, many of the designs submitted previously were woefully inadequate, yet were approved by USEPA with few revisions.*

Response: We could not agree with your characterization that the five-year review panel found design documents "woefully inadequate". The remedial design process we intend to follow provides several opportunities for meaningful involvement by the stakeholders in the community advisory group. At key milestones, the community advisory group will be briefed on important design documents and review drafts will be provided to stakeholders wanting them.

41. *Comment: The amended Record of Decision and design documents must clearly*

spell out the requirements and standards for protecting workers, the public and the environment, and the rights of private and public property owners during removal activities. Maintaining site security and posting appropriate (number and type) warning signs around the perimeter of the site is essential. Extensive control measures, designed to prevent fugitive dust, track out of soils/wastes to public rights-of-way, damage to utilities, excessive noise, and the release of contaminants to storm water run off and/or groundwater, must be specified and implemented. Disruption of local traffic flow in the vicinity of the site and impacts to adjacent or nearby properties must be minimized.

Response: We expect to address these action- and location-specific requirements in site-specific work plans created by the contractor in the design process. Site security and signage are also important to us. Your list of control measures tracks with the kinds of impact mitigation plans to be prepared by our contractor.

42. *Comment: Extensive air monitoring must be planned and put in place to ensure that offsite impacts do not occur. Monitoring procedures and data of sufficient quality must be available and evaluated to prove that no offsite impacts occur. The number, locations, and types of air monitoring stations should be clearly specified, as well as the types and frequency of sample collections and the use of that data. Air monitoring data must be made available on as short a turn-around as possible. Denver expects it to be expeditiously reviewed, evaluated and corrective measures taken should standards be exceeded.*

Response: USEPA intends to plan and install appropriate air monitoring and to have contractual controls in place to ensure that the contractors minimize and mitigate any offsite impacts. We don't expect that the operation can be conducted with absolutely no offsite impacts. We fully anticipate that the selected remedy can be implemented with minimal impacts acceptable to the community in consideration of the long-term benefits obtained by the remedy.

43. *Comment: High-volume air monitors must be installed on each boundary of the site and operated on a daily basis throughout site construction activities. Monitor locations, sampling frequency, analytical parameters, and detection limits must be evaluated by an independent air monitoring expert. The independent expert should be asked to make recommendations regarding the necessity for monitors placed in the community. Monitoring must begin as soon as monolith materials are exposed and extend until confirmation sampling demonstrates all contaminated materials have been removed offsite. Monitoring must continue*

during any periods of construction shut-down, in order to evaluate if interim controls are effective at limiting offsite migration of contamination. Filters must be analyzed for radioactive and metal contaminants.

Response: We accept this comment and will carry it forward into the design process as a design basis criterion during the scoping process of the remedial design development.

44. *Comment: Because high-volume sampling results will not be available in time to take corrective actions, a realtime air monitoring system must be designed and implemented to measure and record real-time particulate levels throughout construction activities. In addition, as required by Denver ordinance, no visible dust must be allowed to cross property boundaries. The real-time air monitors should be equipped with collection filters in order to collect and analyze samples that can be correlated with specific periods of remedial activities and any periods of elevated dust levels.*

Response: We accept this comment and will carry it forward during the scoping process of the remedial design development. We request that you provide us a citation for the ordinance or otherwise make it available to our contractor when the time comes. Local ordinances are not ARARs.

45. *Comment: Unless an on-site meteorological station is provided and analytical results are collected such that periodic shifts in wind direction can be accounted for in analytical results, no subtraction of upgradient concentrations from down-gradient concentrations should be allowed. The independent expert charged with evaluating the air monitoring system must also evaluate proposed methods for assessing whether contaminants have migrated from the site via air.*

Response: We accept this comment and will carry it forward into the design process as a design basis criterion during the scoping process of the remedial design development.

46. *Comment: Plans must be developed that clearly spell out situations that would trigger immediate shutdown of work, such as blowing dust, encountering unexpected or high levels of contamination, high precipitation events, failure of contaminant control(s) or contaminant monitoring equipment, or high wind conditions. Remedies for these situations must be provided which solve the problem; simply turning off equipment and allowing materials to blow offsite is unacceptable.*

Response: We accept this comment and will carry it forward into the design process as a design basis criterion during the scoping process of the remedial design development.

47. *Comment: An effective means for identifying and addressing community concerns during construction must be identified in the ROD and put in place.*

Response: USEPA is preparing a community involvement plan which identifies effective ways for the community to identify their concerns before demolition starts and throughout the conduct of operations. The CIP will also prescribe standard practices for addressing those concerns. We expect most of these issues will be resolved at the community advisory group meetings.

48. *Comment: An extensive confirmation sampling and closeout survey program must be designed and implemented to assure that all contaminants of health and environmental concern are removed.*

Response: We accept this comment and will carry it forward into the design process as a design basis criterion during the scoping process of the remedial design development. The contaminants of concern identified for this monolith and soils remedy will be removed.

49. *Comment: The need for institutional controls remains, because even after the monolith and surrounding contaminated soils have been removed from the Shattuck site, residual radioactive and/or other hazardous contaminants will continue to impact groundwater and the sediments in contact with plumes. The Five-Year Review Report addressed institutional controls and concluded that they were insufficient for this site. The Report concluded that groundwater use control was needed, and that "the site remedy should be re-evaluated to address groundwater and surface water in a proactive manner, through both more definitive site characterization and possibly more aggressive remediation strategies." The ROD must address the institutional controls that will be necessary, where they will be applied, the mechanisms that will be utilized, and those responsible for implementing, enforcing and paying for implementation. A shifting of costs to local government without providing a funding mechanism will be absolutely unacceptable.*

Response: This ROD amendment does not address institutional controls. Further evaluation of these and other types of institutional controls would take place during the supplemental investigation discussed earlier for addressing unresolved groundwater issues.

50. *Comment: We still do not know the full extent of or impacts from the contamination released to storm water sewers and other underground utilities, but we know the West Iowa Avenue storm sewer system and the South Santa Fe Drive (outfall S-131-E) are contaminated by hazardous substances released to groundwater. Denver identified and USEPA confirmed storm sewer contamination discharging to the South Platte River from the Santa Fe Drive storm sewer system and its outfall S-133-E. Further investigations of the storm water sewers and any other preferential pathways are needed to assure that the remedy meets performance objectives, and that additional contamination of groundwater, surface water and sediments of the South Platte River do not occur.*

Response: We are conducting a supplemental field investigation process to collect additional site data and update our site conceptual model where these preferential flowpaths of concern may be addressed. Your concern expressed in this comment is not within the scope and role of this ROD amendment action.

51. *Comment: We still do not know whether the deep aquifers are contaminated because they have not been investigated. Shattuck contends that concerns regarding contamination of the Denver Formation are unfounded because everyone concluded that groundwater flow is upward from the Denver and contamination could not be traveling downward. Such a conclusion is a gross generalization about the characteristics of a widely variable aquifer based on no site-specific data. The USGS (whose May 24, 1999 letter to USEPA we incorporate herein and request that it be added to the Administrative Record), [Agency for Toxic Substances and Disease Registry] ATSDR, the Environmental Response Team and the Five-Year Review team agree with this conclusion and all agree that further groundwater monitoring in the deeper aquifer is required. At the Shattuck site, the Denver Formation is the first geologic unit underlying the contaminated shallow aquifer in an area that has been significantly eroded by the historical meandering of the South Platte River. Significant drinking water is currently being withdrawn from the Denver aquifer and the underlying Upper Arapahoe, Lower Arapahoe, and Laramie-Fox Hill aquifers. Given the extensive use of the Denver aquifer, the variability of its conditions across the formation, and the contamination in the formation underlying the Shattuck site, water quality in the Denver Formation should be investigated and monitored to determine whether Shattuck's contamination has moved into other underlying drinking water supplies.*

Response: We are conducting a supplemental field investigation process to collect additional site data and update our site conceptual model where any potential impacts to the deeper aquifer will be evaluated. Your concern

expressed in this comment is not within the scope and role of this ROD amendment action. The May 24, 1999 USGS letter report is not part of the administrative record for this action, but has already been made a part of the site file for our ongoing groundwater project.

52. *Comment: Removal of the monolith will not fix the groundwater plume that has been allowed to leave the Shattuck site. The full extent of groundwater and surface water contamination must be defined and addressed. The on-going discharge of contaminated groundwater to surface water must be addressed.*

Response: We appreciate this comment and agree that the fate and extent of groundwater contamination should be addressed further. The scope and role of the proposed plan addresses the monolith and any untreated contaminated soils. We have deferred any further reconsideration of the groundwater component of the original remedy until after we conduct a supplemental remedial investigation, collect additional groundwater data, and update the site conceptual model.

The following list of exhibits incorporated by reference in the City and County of Denver comment submission has been made a part of the administrative record for this action:

January 13, 2000 - Letter to Timothy Fields, Jr. & William Yellowtail from Mayor Webb.

October 14, 1999 - Letter to Timothy Fields from Theresa Donahue re: Denver's comments on technical regulatory, public policy rational for removal of Shattuck.

October 18, 1999 - Letter to John Darabaris from Maureen Dudley re: Denver Radium Site OUVIII.

October 12, 1999 - Letter to John Darabaris from Maureen Dudley.

May 29, 1998 - Letter to Dale Vodehnal & Howard Roitman re: Denver Radium Site Operable Unit VIII from Steve Foute.

October 5, 1999 - Letter to John Darabaris from John Student re: Denver Radium Site OUVIII - Denver's Soil & Groundwater Investigation of Mexico Avenue.

September 24, 1999 - Memo to Shattuck Dialogue Members from Celia VanDerLoop re: Denver Response to John Faught's 8/31/99 memo.

August 31, 1999 - Letter to Timothy Fields from Theresa Donahue re: Denver Radium Operable Unit VIII transmitting compilation of selected referenced documents.

August 16, 1999 - Memo to Shattuck Dialoque Members from Theresa Donahue re: Rebuttal to Comments by Shattuck Regarding Denver's Presentation.

May 28, 1999 - Letter to Jim Hanley & Rafael Gonzalez from Theresa Donahue.

April 30, 1999 - Letter to Tom Sheckels from Theresa Donahue re: Eastern Research Group (ERG).

November 10, 1998 - Letter to Sen. Wayne Allard from Theresa Donahue.

May 29, 1998 - Memo to Dale Vodehnal and Howard Roitman from Steve Foute re: Denver Radium Site, Operable Unit VIII.